TURAH CREEK TIMBER SALE ENVIRONMENTAL ASSESSMENT

October 2002
Montana Department of Natural Resources and Conservation
Missoula Unit Office

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INTRODUCTION TO THE ENVIRONMENTAL ANALYSIS

The Turah Creek Timber Sale Environmental Analysis consists of four chapters:

I. Chapter One- Purpose and Need for Action

A. This chapter outlines the project and explains the purpose and need for actions associated with the project.

B. Explains the process used to obtain public and specialist input and the issues analyzed in the EA.

II. Chapter Two- Alternatives

A. This chapter describes the alternatives evaluated in this analysis. The action and the no action alternative are presented in detail.

B. Provides a summary comparison of environmental effects of the alternatives.

III. Chapter Three- Affected Environment

This chapter presents the existing environment, which would be affected by the actions associated with the project.

IV. Chapter Four- Environmental Effects

This chapter explains the environmental effects of this alternative.

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CHAPTER I

PURPOSE AND NEED FOR ACTION

PURPOSE AND NEED FOR ACTION:

The Montana Department of Natural Resources and Conservation (DNRC) proposes to harvest timber in the Turah Creek area. Under the Action Alternative, the department would harvest approximately 17,000 tons of timber from 365 acres. The proposed action would be implemented in the December 2002.

The lands involved in this proposed project are held by the State of Montana in trust for the support of specific beneficiary institutions. These include public schools, state colleges and universities, and other specific state institutions such as the School for the Deaf and Blind (Enabling Act, February 22, 1889; 1972 Montana Constitution, Article X, Section 11). The Board of Land Commissioners and Department of Natural Resources and Conservation (DNRC) are required by law to administer these trust lands to produce the largest measure of reasonable and legitimate advantage over the long run for these beneficiary institutions (Section 77-1-202, MCA). On May 30, 1996, the Department released the Record of Decision on the State Forest Land Management Plan (SFLMP). The Land Board approved the SFLMP's implementation on June 17,1996. The SFLMP outlines the philosophy of DNRC for the management of state forested trust lands.

The Department will manage the lands involved in this project according to the philosophy in the SFLMP, which states the following:

> Our premise is that the best way to produce long-term income for the trust is to manage intensively for healthy and biologically diverse forests. Our understanding is that a diverse forest is a stable forest that will produce the most reliable and highest long-term revenue stream. ... In the foreseeable future timber management will continue to be our primary source of revenue and our primary tool for achieving biodiversity objectives (DNRC, SFLMP Record of Decision 1996 [ROD-1]).

In order to meet the goals of the management philosophy adopted through programmatic review in the SFLMP, the Department has set the following specific project objectives:

1. Harvest approximately 17,000 Tons of sawtimber to generate a net positive rate of return for the Common School (CS) trust.

2. To manage the forest for appropriate or desired future conditions, characterized by the proportion and distribution of forest types and structures typical of those represented under average historic conditions.

LOCATION:

The location of the proposed project is: Section 36, T 13 N., R 18 W., Missoula County
The proposed project is located 1/4 to 1 mile north of Turah, Montana in the Clark Fork River valley. Nearly the entire project area is visible from Interstate-90 as well as from a number of homes in the community.

DECISIONS TO BE MADE:

The following decisions are to be made as a result of this Environmental Analysis:

- Whether alternatives presented meet the project objectives.
- Which alternative should be selected.
- Whether the selected alternative would cause significant effect(s) to the human environment, requiring the preparation of an EIS.

RELATIONSHIP TO THE STATE FOREST LAND MANAGEMENT PLAN:

In June 1996, DNRC began a phased-in implementation of the SFLMP. The SFLMP established the agency's philosophy for the management of forested trust lands. The management direction provided in the SFLMP comprises the framework within which specific project planning and activities take place.

The plan philosophy and appropriate has been incorporated into the design of the proposed action.

The proposed action is limited to specific management activities which are needed, to implement the timber sale and provide resource protection. This assessment documents site-specific analysis and is not a general management plan or a programmatic analysis of the area. The scope of this environmental analysis (EA) was determined through DNRC interdisciplinary analysis and public involvement.

PUBLIC INVOLVEMENT, AGENCIES, GROUPS AND INDIVIDUALS CONTACTED:

Comments from the general public, interest groups and agency specialists were solicited in the fall of 1999. Newspaper ads were run in the Missoulian, on October 20, 27 and November 3, 1999. Public notices regarding the proposed sale were posted along roads adjacent to the sale area. Notices were also attached to local resident's mailboxes and posted at several local businesses. Scoping letters were mailed to 10 organizations and individuals; (a list of the organizations/individuals contacted is available in the project file). Written and/or verbal comments were received from the following individuals and organizations: Alliance for the Wild Rockies, Missoula; Ecology Center, Missoula, Rocky Sehnert, Clinton and the Confederated Salish and Kootenai Tribes of the Flathead Nation. A public meeting concerning the proposed sale was held on November 4, 1999 at the Bonner school.

The following resource specialists were involved in the project design, assessment of potential impacts, and development of mitigation measures: Brian Gilbert- Consulting Wildlife Biologist, George Mathieus - Hydrologist, Forest Management Bureau, DNRC, Missoula, Pat Rennie - Archeologist, Agriculture and Grazing Management Bureau, DNRC, Helena.

OTHER ENVIRONMENTAL ASSESSMENTS (EAs) RELATED TO THIS PROJECT:

None

PERMITS,LICENSES AND OTHER AUTHORIZATIONS REQUIRED:

Road Use Permit from Plum Creek Timber Company
Easements from Non-Industrial Private Landowners
124 Permit from Montana Department of Fish, Wildlife and Parks

ISSUES:

The following issues were identified during the scoping process. They constitute the basis for the formation of project specifications, development of mitigation measures, and assessment of environmental impacts.

WATER QUALITY

There is a concern that land management activities such as timber harvest and road construction can impact water quality primarily by accelerating sediment delivery above natural levels to local stream channels and draw bottoms. These impacts are caused by erosion from road surfaces, skid trails, log landings and by the removal of vegetation along stream channels.

CUMULATIVE WATERSHED EFFECTS

There is a concern that cumulative watershed effects can be characterized as impacts on water quality and quantity that result from the interaction of disturbances, both human-caused and natural. Timber harvest activities can affect the timing of runoff, increase peak flows and increase the total annual water yield of a particular drainage.

COLD WATER FISHERIES

There is a concern that land management activities such as timber harvest and road construction can impact fish habitat primarily by accelerating sediment delivery above natural levels to local stream channels and by decreasing large woody debris through the removal of recruitable trees near the stream channel.

SOIL RESOURCES

There is a concern that equipment operations and timber harvest on wet sites or sensitive soils can result in soil impacts that effect soil productivity depending on area and degree of physical effects and amount or distribution of coarse woody debris retained for nutrient cycling.

NOXIOUS WEEDS

There is a concern that following disturbance events such as timber harvest activities, invasion and spread of noxious weeds is more prevalent than in undisturbed areas. Noxious weed invasion and spread detrimentally influences surface cover, erosion and native species growth.

VISUAL QUALITY

There is a concern that harvesting timber can create aesthetically unpleasing views of. From a far view perspective, negative aesthetic attributes of a harvest can include roads, skid trails, skyline yarding corridors and hard edges created by cutting unit boundaries. From a near view perspective untreated logging slash, damaged trees and rutted or heavily scarified skid trails can be aesthetically unappealing. Many people also find the uniformly spaced appearance of a thinned stand of trees to be rather unnatural looking.

AIR QUALITY

There is a concern that prescribed burning of logging slash can produce large amounts of smoke that may adversely impact air quality. This is of particular concern adjacent to populated areas such as Missoula that are subject to cold air inversions, which trap pollutants in the populated valley bottom.

NATURAL FOREST CONDITIONS

There is a concern that due to extensive timber harvesting near the turn of the century and decades of effective fire exclusion in the project area, the timber stands in the project area today are very different in structure and species composition than the stands that occupied the site prior to European settlement. Some animal species are dependent or at least prefer pre-settlement forest stand conditions that existed in the pre-settlement era, which no longer occurs on the site. Fire exclusion has lead to an increase in fuel loadings and an increase in Douglas-fir in the stand.

WILDLIFE

THREATENED AND ENDANGERED SPECIES

There is a concern that timber harvesting could alter habitat or create disturbance that would be detrimental to the following Threatened and Endangered species.

Bald Eagle
Grizzly Bear
Gray Wolf
Lynx

SENSITIVE SPECIES

There is a concern that timber harvesting could alter habitat or create disturbance that would be detrimental to the following sensitive species.

Flammulated Owl
Pileated Woodpecker
Boreal Owl
Fisher
Black-backed Woodpecker
Peregrine Falcon

BIG GAME

There is a concern that timber harvesting activities associated with this project could alter habitat or create disturbance that would adversely affect big game species that use the project area.

CHAPTER II

ALTERNATIVES

Introduction

The purpose of Chapter 2 is to describe the proposed alternatives and compare the effects of those alternatives by summarizing the environmental consequences of each. Alternatives were planned through scoping and development of issues, input from Interdisciplinary Team (IDT) specialists, and guidance from resource management standards from the SFLMP. In addition, compliance with trust mandates helped to shape alternatives.

Alternative A: No-Action Alternative: No land management activities would be implemented under this alternative. No road construction or reconstruction would occur. No revenue would be generated for the Common School Trust. Trees on the site would not be thinned and the stand would remain in an overstocked condition.

Alternative B: Action Alternative: Harvest approximately 17,000 tons of sawtimber, from approximately 365 acres, as shown in Figure 2-1, (Project Area Map). Approximately 0.5 miles of permanent road and 0.2 miles of temporary road would be in order to access the project area. Following harvest the temporary road would be obliterated constructed (made undrivable) and the permanent road would be closed to traffic. Harvesting would remove approximately 60% of the tree canopy cover. The residual stand would be composed of roughly 90% ponderosa pine and 10% Douglas-fir. Dominant healthy trees would be retained and approximately 70% of the live ponderosa pine and western larch over 20" would also be retained. 40 to 65 trees per acre, ranging from 10" to 26"in diameter and averaging about 14" would be retained. 300 acres of harvesting would be done with a cut-to-length in woods processing system. 48 acres comprised of steep slopes would be harvested with a skyline cable system. 17 acres would be done with conventional ground based skidding equipment. All logging slash within 200 feet of private property would be jackpot piled and burned following harvesting. Slash in the remainder of the project area would be crushed by equipment on the skid trails during logging and possibly piled and burned after harvest is completed. For further discussion on this topic see (Silvicultural Prescription) in the sale file. This alternative would provide $400,000 to $600,000 revenue to the common school trust.

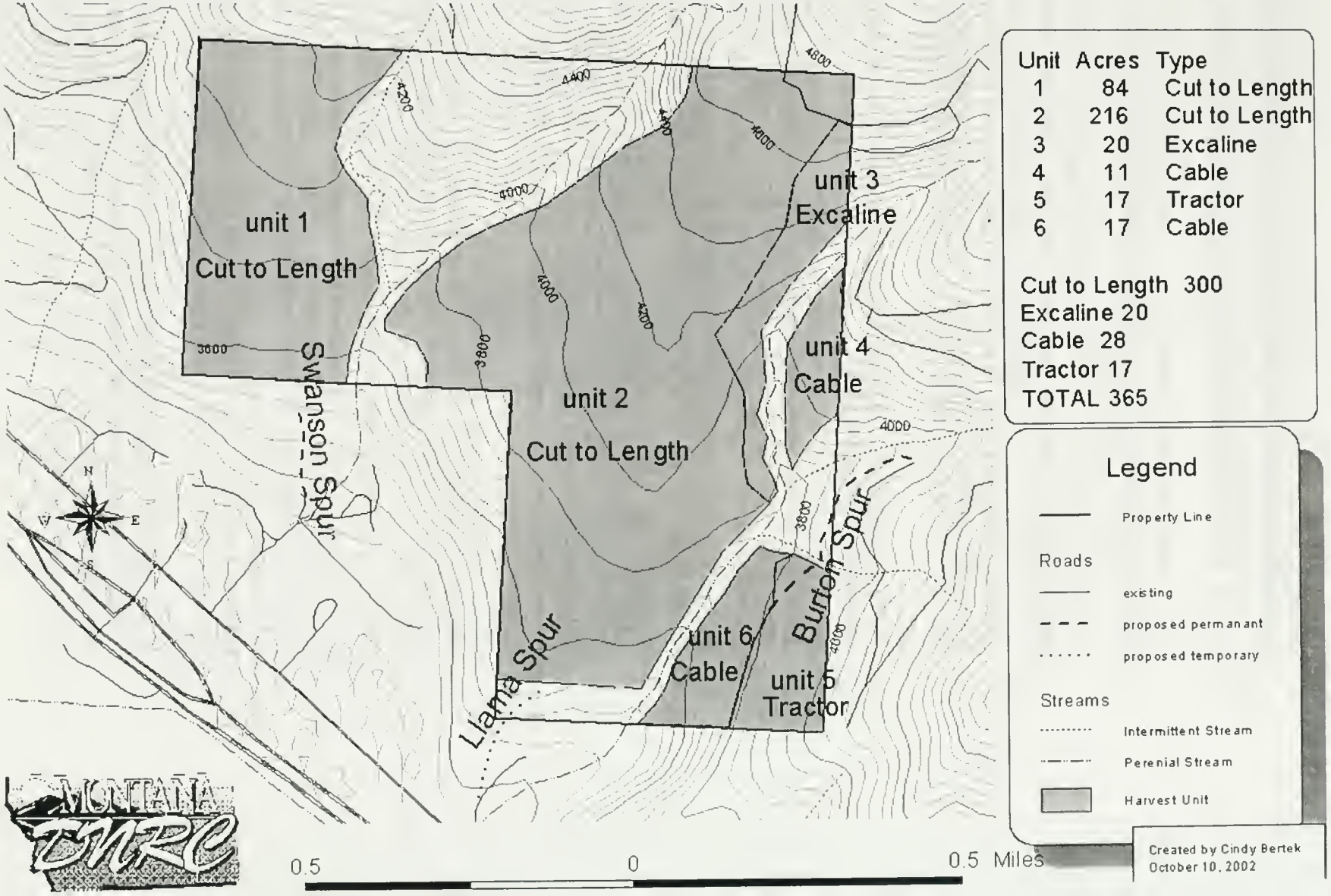
Alternatives Considered but Eliminated:

No other alternatives were developed, because the proposed action alternative addressed all the issues and no issues were left unresolved.

ALTERNATIVE B

Figure 2-1

Sec 36, T13N, R18W



Unit	Acres	Type
1	84	Cut to Length
2	216	Cut to Length
3	20	Excaline
4	11	Cable
5	17	Tractor
6	17	Cable

Cut to Length 300
Excaline 20
Cable 28
Tractor 17
TOTAL 365

Legend

- Property Line
- Roads
  - existing
  - proposed permanant
  - proposed temporary
- Streams
  - Intermittent Stream
  - Perenial Stream
- Harvest Unit

Created by Cindy Bertek
October 10, 2002

MITIGATION MEASURES OF THE ACTION ALTERNATIVE

WATERSHED AND SOIL RELATED MITIGATIONS

- Plan, design and improve existing road systems to meet long-term access needs and to fully comply with current Best Management Practices (BMPs).

- Construct drain dips, grade rolls and other drainage features where necessary and practical to ensure adequate road surface drainage. Install and maintain all road surface drainage concurrent with harvest activities, reconstruction and reconditioning. Drain dips constructed on sustained road grades greater than 8% may require gravel surfacing to function properly. Sustained road grades greater than 10% may require installation of conveyor belt water diverters.

- Newly constructed or reconstructed road cuts and fills shall be grass seeded immediately after excavation.

- Temporary or abandoned roads must be left in a condition that would provide adequate drainage and would not require future maintenance. Roads which are abandoned should be partially obliterated through ripping and seeding. Where it is available, slash should be scattered across the ripped road surface. Water bars should be installed at regular intervals to facilitate surface drainage.

- Construct additional drainage features on all approaches to draw and stream crossings to avoid concentrating runoff at crossing sites. Drainage features should be located close enough to the crossing to minimize the runoff contributing area, but at an adequate distance away from the crossing to provide for effective sediment filtering.

- Drainage features located in areas with inadequate buffer capacity should be provided with effective sediment filtration through the use of slash filter windrows, filter fabric fencing or straw bales. Note: straw bales alone may not be effective in areas with heavy concentrations of livestock or big game.

- Ditches with direct delivery to streams or ephemeral draws need to be filtered at the outlet by using slash or filter fabric and straw bales.

- On new road construction, incorporate slash filter windrows at all draw and stream crossings requiring fills that are more than 2 feet deep.

- Rock armor both the inlet and outlet of all new CMP installations. Provide energy dissipaters at outfall of all new CMP installations. Rock used for armoring should average 12 inches in diameter and not be less than 6 inches in diameter.

- When excavating material in and around stream and draw crossings (i.e. installing new CMPs, cleaning inlets and outlets, constructing ditches, etc.) Special care should be taken so as not to cause an excessive amount of disturbance to the stream channel or area immediately adjacent to the crossing site. Excess or waste material should be disposed of at a location where it will not erode directly into the stream or draw bottom.

- Limit road use and hauling to dry, frozen or snow covered conditions. Suspend operations when these conditions are not met before rutting occurs.

- Where feasible, rip, seed, water bar and slash any non-system roads within the sale area concurrent with construction activities.

- Implement Forestry BMPs as the minimum standard for all operations with the proposed timber sale.

- Use minimum SMZ width required under SFLMP Watershed RMS # 10. These widths may be greater than those required under the SMZ Law and Rules. The SMZ widths prescribed in Watershed RMS # 10 are dependent on: the erosion potential of soils at the site, the steepness of the side slope and the presence of any topographic breaks.

- Protect all ephemeral draws, springs and wet areas with marked equipment restriction zones (ERZ). If absolutely necessary, designate locations for skid trail crossings. Minimize number of crossings and space at 200 feet where feasible. This will minimize soil disturbance within the vicinity of the draws. Use designated crossings only under dry or frozen conditions.

- The logger and sale administrator will agree to a skidding plan prior to equipment operations. Skid trail planning would identify which main trails to use, and what additional trails are needed. Trails that do not comply with BMPs (i.e. draw bottom trails) would not be used and would be closed with additional drainage installed where needed or grass seeded to stabilize the site and control erosion.

- 5 – 10 tons per acre of coarse woody material larger than 3 inches in diameter shall be left scattered throughout the sale units, predominately perpendicular to the slope. The Forest Officer will determine the appropriate amount of material to be retained and pieces that would otherwise be skidded may be left for this purpose. This may require return skidding of slash. Piling or redistribution may be required where fuel levels are high. Excavator is preferred and tractor piling would not be used on slopes over 30%.

- Apply grass seed to disturbed skid trails on grades over 30% where erosion or weeds are a concern. Scatter slash on skid trails where feasible.

- No slash burning may occur in or near areas of concentrated ephemeral flow.

Noxious Weed Mitigation Measures

- Weed control shall be implemented to help reestablish ground cover for erosion control and to reduce weed spread.
- New roads would be grass seeded as soon as possible after they are constructed.
- All equipment shall be cleaned of plant parts, mud and weed seed to prevent the introduction of noxious weeds. Equipment will be subject to inspection by Forest Officer prior to moving on site.
- Biological controls for various weed species would be released as they become available.

Visual Quality Mitigation Measures

- Retain 40 to 65 of the biggest trees per acre to maintain a forested landscape with no unnatural appearing openings.
- Utilize a Cut to Length logging system to minimize impact of skid trails.
- Locate access roads and place skyline yarding corridors so they are not highly visible to populated areas.
- Keep new roads off of steep slopes where they would be more visible.

Air Quality Mitigation Measures

- Burning would only be conducted during periods of good to excellent smoke dispersion.
- Burning would be done under weather and fuel conditions so that smoldering combustion is kept to a minimum.

Wildlife Related Mitigation Measures

- If any threatened or endangered species are encountered during the project planning or implementation periods, all project-related activities that would potentially affect that species would cease and a DNRC wildlife biologist would be informed immediately. Additional habitat protection measures would be designed and implemented as appropriate.
- If active den sites or nest sites of threatened, endangered, sensitive species, or other raptors were located within the Project Area, activities would cease until a qualified biologist can review the site and develop species appropriate protective measures.

- Public access within the Project Area would be managed to minimize disturbance to wildlife, minimize incidental effects to habitat features such as snags and downed woody debris, to reduce potential effects on threatened, endangered, and sensitive species, and to manage big game harvest vulnerability.

Environmental effects from both alternatives are summarized in Table 2-1.

Table 2-1. Summary of Environmental Consequences

Issue	Alternative A-No Action	Alternative B-Harvest
Water Quality	No Change from current condition	The proposed improvement of the main access road is expected to result in long term improvements to downstream water quality and improved protection of beneficial uses in the affected watershed. There is little risk of adverse impacts to beneficial uses occurring as a result of the proposed action.
Cumulative Watershed Effects	Water yield under current conditions is estimated at 5.8% over normal.	Cumulative water yield is expected to increase to 7.2% over naturally occurring conditions—well within established DNRC thresholds.
Cold Water Fisheries	No effects to fisheries are predicted under the no action alternative	Implementation of the SMZ Law and Rules, Best Management Practices and site specific recommendations of the DNRC soil scientist and hydrologists will minimize the potential impacts of the proposed action on the cold water fisheries in the affected streams.
Soils Productivity	No change in existing compaction of the area, occurring on old skid trails and landings. Slow increase of coarse woody debris.	Harvest mitigation measures (e.g., skid trail planning and limits on season of use) would limit soil impacts to 15% or less of harvest area. Mitigation measures would retain fine litter and coarse woody debris for nutrient cycling by use of in-woods processing or return skidding of slash.
Noxious Weeds	Gradual increase in weed density over time. Integrated weed management efforts would continue on the site	Greater increase in noxious weed density and occurrence compared to the no action alternative due to soil disturbance and decreased tree canopy. Integrated weed management efforts would continue on the site. Control

		efforts would emphasize treatment of any new noxious weeds
Visual Quality	No change from current state. Increased potential for stand replacement wildfire in the long term.	Following treatment all stands would have a more open appearance. Steeper slopes that are visible from a distance will have a mottled green and white appearance in the winter in contrast to their solid green appearance now. Skyline corridors would be angled away from populated areas. It is unlikely they would be visible from the valley floor. New roads are located on gentle slopes and would be screened by trees below the road.
Air Quality	No smoke would be produced from slash burning. There would be no effect on air quality.	Burning associated with slash disposal would only be done on days with good to excellent smoke dispersion. We would comply with air quality laws by following the procedures of the Montana-Idaho state airshed group. Smoke may settle into the Turah area overnight. However smoke impacts should be minor and of short duration.
Natural Forest Conditions and Forest Health	Trees would continue to stagnate due to overstocking. Douglas-fir would continue to replace ponderosa pine on the site. Frequent outbreaks of pine beetle could be expected due to the stressed condition of the stand. Large diameter ponderosa pine would likely not be restored on the site. There would be an increased potential for stand replacement wildfire in the long term.	Harvesting would move the stands closer to their pre-settlement state of open grown stands dominated by ponderosa pine. Growth rates and health of trees would improve due to a reduction in stocking levels.
Wildlife		
Bald Eagle	No cumulative effect in short term and only minor effect in the long term	Minimal direct and cumulative effect
Grizzly Bear	Minimal potential effect due to low quality habitat.	Minimal direct and cumulative effect
Gray Wolf	No Change from current condition. No effect on wolves.	Minimal to no direct and cumulative effect
Lynx	No Change. No effect due to poor Lynx habitat	No direct or cumulative effect

Flammulated Owl	No Change. Minor short term positive effect and a minor long term negative effect.	Minor positive indirect and cumulative effect
Pileated Woodpecker	Positive effect in the short term, negative effect in the long term	Minor negative effect in the short term and positive effect in the long term.
Boreal Owl	No Change. No effect due to lack of potential Boreal Owl habitat.	No effect due to lack of potential Boreal Owl habitat.
Fisher	No Change. No short term effects. Minor potential for long term effects.	Minor potential for short term negative effect and minor long term positive effect.
Black-Backed Woodpecker	No Change from current condition. Minor positive effect due to increased risk of stand replacing fire.	Potential for minor adverse effects due to reduced potential for stand replacing fire.
Peregrine Falcon	No change. No effect due to lack of suitable habitat	No effect due to lack of suitable habitat
Big Game	Minor positive effect in maintaining hiding and security cover.	Reduction in hiding cover resulting from harvesting. Minor and short term adverse effect.

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CHAPTER III

AFFECTED ENVIRONMENT

Introduction

This chapter discusses the existing environment and includes effects of past and ongoing management activities within the analysis area.

INTRODUCTION TO WATERSHED ISSUES

The following paragraphs contain background information for the watershed and hydrology portions of the proposed Turah Creek Timber Sale Environmental Assessment. This analysis includes an existing condition assessment of all watersheds draining the proposed sale area. Write-up and assessments are based on a coarse filter screening approach, Equivalent Clear-cut Acres (ECA) and water yield modeling, and on-site field reviews of all contributing areas within the proposed state section.

The proposed sale area is located near Turah, approximately 9 miles east of Missoula, Montana. The proposed sale area is located within one 480 acre state section that lies along two watershed divides, Turah Creek and 2 unnamed streams, all of which drain into the Clark Fork River.

The watershed analysis area addresses three watersheds draining the sale area to facilitate hydrologic analysis and cumulative watershed effects assessment. A description of those drainage's follows:

Turah Creek:

This 1304-acre watershed receives an average of 25 inches of annual precipitation. It is a Class I perennial stream under the Streamside Management Zone (SMZ) Law, however, it does not have continuous surface water connectivity with the Clark Fork River. Turah Creek is intercepted by an irrigation ditch near Interstate 90 and is not expected to reach the Clark Fork River.

Unnamed Tributary #1:

This 702-acre watershed receives an average of 25 inches of annual precipitation. It is a Class II intermittent stream under the SMZ Law and rules. This stream channel flows subsurface as it reaches a talus slope prior to the valley floor.

Unnamed Tributary # 2:

This 541-acre watershed receives an average of 25 inches of annual precipitation. It is a Class II intermittent stream under the SMZ Law. This stream flows subsurface prior to reaching the valley floor and does not have any surface connectivity with the Clark Fork River.

Regulatory Framework:

This portion of the Clark Fork River basin, including the Turah Creek drainage, is classified B-1 in the Montana Water Quality Standards. Waters classified B-1 are suitable for drinking, culinary and food processing purposes after conventional treatment; bathing, swimming and recreation; growth and propagation of salmonid fishes and associated aquatic wildlife, waterfowl and furbearers; and agricultural and industrial

water supply. State water quality regulations prohibit any increase in sediment above naturally occurring concentrations in waters classified B-1 (ARM 16.20.618 2(f)).

Naturally occurring means conditions or materials present from runoff or percolation over which man has no control or from developed land where all reasonable land, soil and water conservation practices have been applied. Reasonable land, soil and water conservation practices include methods, measures or practices that protect present and reasonably anticipated beneficial uses. The state of Montana has adopted Forestry Best Management Practices (BMPs) through its Non-point Source Management Plan as the principal means of meeting Water Quality Standards.

Existing beneficial uses in the immediate vicinity of the proposed sale area include water rights for groundwater sources to include stock, irrigation, fire protection, commercial and domestic uses. Surface water sources include irrigation, stock, and industrial (railroad) uses. There are no sensitive beneficial uses in the sale area, however; downstream sensitive beneficial uses include aquatic life support and cold-water fisheries.

The Clean Water Act and EPA Water Quality Planning and Management Regulations require the determination of allowable pollutant levels in 303(d)-listed streams through the development of Total Maximum Daily Load (TMDL) limits. The TMDL process is used to determine the total allowable amount of pollutants in a water body of watershed. Each contributing source is allocated a portion of the allowable limit. These allocations are designed to achieve water quality standards.

The Montana TMDL Law (75-5-701MCA) directs the Department of Environmental Quality to assess the quality of state waters and to develop TMDL for those waters identified as threatened or impaired. Under the Montana TMDL Law, new or expanded nonpoint source activities affecting a listed water body may commence and continue provided they are conducted in accordance with all reasonable land, soil and water conservation practices. DNRC will comply with the Law developed by DEQ through implementation of all reasonable soil and water conservation practices, including Best Management Practices and Resource Management Standards as directed under the State Forest Management Plan. There are no 303(d) listed streams within the analysis area.

The Montana Streamside Management Zone Law (MCA 77-5-301) and Rules (SMZ Law) regulate timber harvest activities that occur adjacent to streams, lakes and other bodies of water. This law prohibits or restricts timber harvest and associated activities within a predetermined SMZ buffer on either side of the stream. The width of this buffer varies from 50-100 feet, depending on the steepness of the slope and the class of the stream.

The Montana Stream Protection Act (MCA 87-5-501) regulates activities conducted by government agencies that may affect the bed or banks of any stream in Montana. This law provides a mechanism to require implementation of BMPs in association with stream bank and channel modifications carried out by governmental entities. Agencies are

required to notify the Montana Department of Fish, Wildlife and Parks (MDFWP) of any construction projects that may modify the natural existing conditions of any stream.

WATER QUALITY

Approximately 19 miles of Plum Creek Timber Company (PCTC) roads provide access to the sale area. These roads are high standard forest roads, which are closed to the public and currently meet BMP standards aimed at protecting soil and water quality.

The existing roads and stream crossings are expected to continue to meet current BMP standards provided that there is a continuation of routine maintenance and season of use restrictions.

CUMULATIVE WATERSHED EFFECTS

Past management activities in both watersheds include grazing; fire suppression, road construction and timber harvest. Timber harvest activities have been extensive over the past 15 years, constituting approximately 929 acres in Turah Creek, and 115 acres in the Unnamed Tributary # 1.

All drainage features in the proposed sale watershed analysis area were inventoried and evaluated by a DNRC hydrologist. Stream channel evaluations (Pfankuch, 1975) were used to assess stream stability and impacts of development and past management activities in both Turah Creek and Unnamed Tributary # 1. Channel conditions along all reaches evaluated were rated in "good" condition.

A cumulative watershed effects (CWE) analysis for the proposed sale area was completed by DNRC to determine the existing conditions of the affected watersheds and the potential for cumulative effects due to increased water and sediment yields. The Turah Creek and adjacent Unnamed Tributary #1 watersheds were chosen as the analysis boundaries. These analysis areas were selected because they were determined to be the most appropriate scale to determine potential effects.

The CWE analysis was completed using a level II screening (outlined in SFLMP Watershed RMS # 7) by DNRC to determine the existing conditions of the proposed sale area using the Equivalent Clearcut Area (ECA) methodology outlined in Forest Hydrology Part II (Region 1- USFS, 1974). This methodology was also used to estimate existing Water Yield Increases (WYI) in each watershed. WY1 is calculated as a function of area (acres) treated, percent forest crown removal, precipitation patterns and estimates of the amount of hydrologic recovery due to vegetative regrowth. Harvest history and road information compiled for this analysis was obtained from PCTC and DNRC harvest records, and PCTC 1999 aerial photos.

Models used to predict ECA and WYI typically overestimate due to the fact that the model assumes 100% forest cover prior to management activities. Given the historic fire regime in the Turah Creek watershed, complete canopy cover was highly unlikely. Using local knowledge of characteristics indicative of ponderosa pine and Douglas-fir stands in the Missoula area, estimations of historic canopy cover were made using 1996 aerial photographs. Expected historic canopy cover ranged from 35-85%, depending on slope, aspect and elevation. The results of this analysis are summarized below in table 3-1:

TABLE 3-1.

TURAH CREEK PROPOSED TIMBER SALE
Watershed Existing Conditions Analysis (Not including proposed activities)

Watershed	Drainage Pattern	Total Acres	Existing Road Miles	Total ECA	Area in ECA	Water Yield Increase*
Turah Creek	Perennial	1304	9.8	418 ac.	32%	12.1%
Unnamed # 1	Intermittent	702	5.3	65 ac.	9%	5.6%
Unnamed # 2	Intermittent	541	1.7	161 ac.	30%	7.7%

* Water Yield Increase (WYI) is an estimate of percent water yield over expected natural levels due to management activities.

All primary and secondary roads within the proposed sale area were evaluated for past or potential impacts. Field evaluations indicate that past management activities within the analysis area have resulted in impacts to water quality. These impacts are limited to sediment delivery and erosion from roads and cattle use and are restricted to stream crossings and isolated segments of existing roads. Results from the cumulative watershed effects analysis estimate increases in average annual water yield due to timber harvest and road construction in Turah Creek is below the 15% threshold set by DNRC. Thresholds are established using a matrix guide developed for the State Forest Land Management Plan (SFLMP) Watershed RMS # 7, which uses an acceptable risk level, watershed sensitivity and resource value as its parameters.

COLD WATER FISHERIES

There is no known fish presence documentation on any of the streams draining the State section in the proposed sale area. The majority of the sale area has drainage features that would not support fish. There is no available fish data for Turah Creek, however fish were observed at the Interstate 90 culvert. The main drainage features within the State section are intermittent and perennial, thus fish presence is expected. No fish barriers above the interstate crossing were noted. It is expected that surface connectivity with the

Clark Fork River occurs infrequently, when seasonal flows are above normal. Therefore, any fish species present are likely isolated.

Past grazing and timber harvest management have likely resulted in increased sediment and a decrease in the riparian shrub component and recruitable trees for in-channel large woody debris along existing stream channels. It is likely that these impacts have resulted in loss of shade cover, bank stability, recruitable trees and increased temperatures however, field observations indicated a healthy riparian component along the affected stream channels. Both stream channels draining the proposed sale area are intercepted by irrigation ditches. Therefore, lack of surface connectivity has resulted in unlikely impacts to downstream fisheries.

SOIL RESOURCES

The terrain is moderate to very steep mountain sideslopes with some abrupt slope breaks and deeply incised draws that reflect the structural bedrock control of the landscapes. Bedrock is mainly stable, Bonner Quartzite, Missoula Group Argillite, with lacustrine deposition in the draw bottoms. Scree slope and rock outcrops are common on steeper slopes.

Soil types are closely related to the bedrock type. Soils mapping units within State Section 36 consist of Winkler and Bigarm Series. The two Winkler series are Winkler very gravelly sandy loam and Winkler gravelly loam. The very gravelly sandy loams occur on 30-60% southwest aspect slopes while the gravelly loams occur on cooler, 8-30% slopes. Both are very deep, somewhat excessively drained soils formed from colluvium.

The two Bigarm series (16 & 17) are both gravelly loams. Both are very deep and somewhat excessively drained soils on 0-15% slopes, derived from alluvium. Bigarm soils have more clay in subsoils and have more moisture available for plant growth. Bigarm soils tend to remain moist later into the spring and have a shorter season of use than Winkler soils.

No especially unique or unstable terrain was noted within the project area.

NOXIOUS WEEDS

Noxious weeds, mainly knapweed, (*Centaurea maculosa)* with lesser amounts of bull thistle, *Cirsium vulgare,* dalmation toadflax, (*Linaria dalmatica)* and sulfur cinquefoil (*Potentilla recta)* occur within the analysis area mainly adjacent to private property that has experienced soil disturbance in the past. Weeds are generally absent over much of the project area due to the closed tree canopy and lack of recent soil disturbance.

VISUAL QUALITY

The entire project area is very visible from the Turah area and Interstate 90 near the Turah exit. Most of the project area has a closed canopy, dense forest appearance from both a near and far view perspective. A number of private homes border the project area. There is only 0.2 miles of road within the project area, which is effectively screened from view by the trees below it.

AIR QUALITY

Products of Combustion:

When forest fuels burn, complex organic molecules composed primarily of Carbon, Hydrogen and Oxygen break down and then recombine with oxygen. If combustion were 100% complete the only products produced would be water vapor and carbon dioxide. However complete combustion is only achieved under very controlled conditions and combustion of forest fuels is very incomplete. Some of the products of incomplete combustion are carbon monoxide, particulate matter and a wide variety of volatile organic compounds (VOCs). A fire that burns at a high temperature burns more completely and produces less particulate and other partial combustion products than a fire that burns at a lower temperature. Dry fuel that burns with flaming combustion, burns hotter and therefore cleaner than fuel that is wet and burning at a lower temperature. Fuel that burns with an adequate supply of oxygen burns hotter and cleaner than fuel that is buried by dirt and therefore getting an inadequate supply of oxygen. Fire that is in the smoldering stage of combustion is cooler than the flaming stage and therefore produces more partial combustion products.

Characteristics of Smoke in the Missoula Area:

The project area is located approximately 9 miles east of Missoula. The mountain valleys of Western Montana are prone to cold air inversions in the fall and winter when stationary high pressure systems create a stable air mass that traps pollutants in the valley bottom. During the spring season, the atmosphere is much more unstable and stable cold air does not settle into the valleys to the extent it does in the fall or winter. Due to this atmospheric instability, smoke is less likely to main in the valley in the spring.

Effects of Smoke on Human Health:

The most problematic pollutant in the Missoula area is particulate matter. Particulate is produced by a number of sources such as road dust from vehicles, forest and agricultural burning, industrial sources, windblown dust from plowed fields, smoke from wildfires and other sources. Particulate is classified by its size. PM-10 is less than 10 microns in diameter. PM-2.5 is less then 2.5 microns. The smaller a particle is, the greater impact it can have on human health. Smaller particles are able to penetrate farther into the human respiratory system. Smaller particles are also more difficult for the human body's natural processes to remove.

Regulation of Open Burning:

Missoula County is a PM-10 Non-Attainment area as designated by the Environmental Protection Agency and the Montana Department of Environmental Quality. Open burning is allowed in Missoula County from March 1 to August 30 of each year. From September 1 to November 30 burning is permitted for forestry purposes only. No burning is allowed from December 1 to February 28. The Montana DNRC is a member of the Montana-Idaho Smoke Management Group. This group is composed of the major forestry burners in Idaho and Montana. Members of the group report their planned burns to a monitoring unit in Missoula before they are ignited. The goal of the smoke monitoring unit to not allow the average PM-10 level for a 24 hour period to exceed 50 milligrams per cubic meter of air. Idaho and Montana are divided into "airsheds" which are geographic areas with similar topography and weather patterns. Urban areas within these airsheds are designated as impact zones. Due to the potential for adverse impacts to air quality in urban areas, burning in these impact zones is much more restrictive than the airshed it is located in as a whole. The Turah Creek project area is located in Airshed 3A and the Missoula Impact Zone as designated by the Montana/Idaho Airshed Group. The Montana/Idaho Airshed Group Monitoring Unit issues daily smoke dispersion forecasts and burning restrictions for each airshed and impact zone. Restrictions are based on the number of burns planned, their location and atmospheric conditions. These restrictions are designed to limit the adverse impact to air quality resulting from prescribed burning

NATURAL FOREST CONDITIONS

While we have no record of large scale logging on this section of state land, we can safely assume it was logged in the late 1800's when logging operations were very active in the Bonner area. This past harvesting and decades of fire exclusion have caused significant changes in stand structure and species composition of the timber stands within the project area. Prior to European settlement sites such as this one were frequently open park-like stands, composed of large diameter ponderosa pine and some Douglas-fir. This condition was maintained by frequent low intensity surface fires that killed young shade tolerant species such as Douglas-fir in the understory but generally did not kill the large trees in the overstory (Arno 1988). Within these foothill vegetation communities on southerly aspects, sizable acreages of dense mature forest were rare. Mature forest patches were likely open and fragmented by naturally occurring wildfire events. Thus, stands and corridors usable by species associated with dense, interior forest conditions were likely rare within the project area under natural conditions.

Logging of the large pine on the site coupled with the beginning of effective fire suppression led to the establishment of dense regeneration, with a higher proportion of the more shade tolerant Douglas-fir. With the absence of fire, these stands became overstocked and stagnated. Currently the stand has 134 trees per acre over 7.0' DBH, average diameter is 12". There is 116 square feet of basal area per acre. Fuel accumulations increase as trees die from competition and environmental stresses. In this dry climate, decomposition can take several decades. Overstocking and the associated stress due to competition between the trees for moisture and nutrients can lead to increased attack by insects such as pine engraver beetle. This dense stand structure and the development of an understory of Douglas-fir form a very effective fuel ladder that

allows a ground fire to climb into the crowns of the large overstory trees and kill them. These high fuel loadings and dense stand conditions have led to high intensity, stand replacing wildfire in stands where they were uncommon in the past (Arno and Brown 1991).

WILDLIFE

Analysis Area

An Analysis Area was developed to assess existing conditions and environmental consequences, as well as cumulative effects, of the proposed action for threatened and endangered, sensitive, and big game species which are likely to be influenced by management. This area was generally described by a polygon inclusive of all lands within one mile of the parcel where treatment is proposed. For some species, where it was biologically justified, a larger Analysis Area was delineated. Any divergence from the general Analysis Area was described in the narrative for that species. If no description of the Analysis Area is included in the narrative for a species, then the general Analysis Area described above was used. For clarity, "Project Area" will refer to the area within the boundaries of the proposed harvest.

Bald Eagle

Bald eagles likely occur both inside and outside of the Analysis Area. They are primarily associated with the Clark Fork River, which is approximately 0.5 to 1.5 miles distant from the Project Area to the south. Bald Eagles are listed as a Threatened species in Montana under the Endangered Species Act (ESA). Forest habitats frequented by bald eagles are typically near (<1 mile) large, visible bodies of water. Bald eagles show a strong preference for multi-layered, mature or old growth forest stands with large emergent trees and snags for nesting and perching sites (MBEWG 1991). Winter habitat generally occurs near local food concentrations, generally along major river drainages and around large lakes (MBEWG 1991).

Known nest sites and nesting habitat: Bald eagles nest and winter along the Clark Fork River, however no bald eagle nest sites or roosting habitats are known to occur within the Project Area. The closest known nest is the Milltown Pond nest site located approximately 2.5 miles distant to the northwest and the Allen Creek nest site located approximately 3 miles to the southeast along the Clark Fork River (pers. comm., D. McCleerey, BLM, 3/19/02). Some nest sites also occur on the Blackfoot River to the north, however these sites are not likely to be associated with any nesting/roosting habitat in or near the Project and Analysis Areas. Potential for use by nesting bald eagles is very low within the Project Area due to the limited availability of large trees preferred for nesting and perching. Stands proposed for treatment are generally composed of single strata stands of medium to small sized trees. Emergent trees of adequate size and structure for nesting are rare. Foraging by bald eagles likely occurs within the Analysis Area, primarily associated with the Clark Fork River, however some foraging on road and winter-killed ungulates also likely occurs in the area to the south of the Project Area.

Wintering areas: Bald eagles are known to winter on the Clark Fork River, however no known high concentration areas or communal roosts occur within the Project or Analysis Areas (pers. comm., D. McCleerey, BLM, 3/19/02). Wintering bald eagles generally roost and concentrate activity near open water (MBEWG 1991). Wintering eagles can also concentrate activity in areas with high densities of wintering ungulates where they forage on winter killed carrion, especially in late winter. However, the Project and Analysis Areas generally do not contain high concentrations of wintering animals and therefore would not attract concentrations of wintering bald eagles.

Grizzly Bear

Grizzly bears are currently classified as Threatened in Montana under the ESA. Grizzly bears are a wide ranging species and therefore a larger Analysis Area was necessary to assess effects. The Analysis Area used in this assessment was the area encompassed by the following Townships: T13NR18W, T13NR17W, portion of T12NR18W and T12NR17W north of the Clark Fork River, and the eastern half of T13NR16W and T12NR16W. This area generally encompasses the area east of Bonner, Montana, south of Montana 200 and north of the Clark Fork River and the Interstate 90 corridor.

Grizzly bears utilize a wide range of habitats, from low elevation riparian areas to high elevation berry fields, however habitat use is greatly influenced by the presence of human activity, which can result in bear-human conflicts that can increase grizzly bear mortality risk. Human access to preferred habitats, as represented by total and open road densities, is therefore an important factor in grizzly bear habitat use. The proposed harvest activities are approximately 12 miles distant, and separated by a major highway (i.e. Montana 200), from the Northern Continental Divide Grizzly Bear Ecosystem. Therefore, the likelihood that grizzly bears would occur within the Analysis Area in the near term is low. However, grizzly bears are wide ranging species and it is feasible that grizzly bears could utilize habitats within the Analysis Area. Grizzly bears utilize low elevation riparian areas in the spring, where they feed on grasses and forbs. In addition, grizzly bears forage in big game winter range areas in the spring in search of winter-killed carrion. The Clark Fork River in the southern portion of the Analysis Area is a high quality low elevation riparian area that would be preferred by grizzly bears. However, the presence of a major highway complex and dispersed, but extensive human development in and near the southern portion of the Analysis Area, greatly reduce the value of these habitats and likely preclude the use of this area by grizzly bears. Within the Project Area, existing riparian areas generally do not contain large amounts of high quality riparian habitat that would provide extended foraging opportunities for grizzly bears.

Gray Wolf

Wolves are currently classified as endangered in Montana under the ESA. Due to the large territories of wolf packs, the Analysis Area described for grizzly bears will be used for this analysis also. There are no documented denning sites or known consistent use areas within the Project or Analysis Areas. The level of activity that would be expected

if a pack occupied this area has not been documented (Ed Bangs, USFWS, pers. comm., 18 March 2002). The closest established active wolf pack is the Lupine pack located northwest of Lolo Hot Springs, which is approximately 36 miles to the west. Wolf activity has also been detected around Seeley Lake approximately 30 miles to the northeast (Ed Bangs, USFWS, pers. comm., 18 March 2002).

Wolves are wide ranging and forage primarily on big game. The Analysis Area generally does not contain big game winter range with large concentrations of animals, although some deer, elk and occasional moose utilize the Project Area during winter (Mike Thompson, Montana FWP, pers. comm., 29 March 2002).

Lynx

The lynx is currently listed in Montana as a threatened species under the ESA. Lynx are a forest dwelling, medium sized carnivore with home ranges averaging between 43 and 115 km^2 in Montana studies (Aubry et al. 1999). Due to these large home ranges, the Analysis Area used in the grizzly bear and wolf assessment will be used here.

Although we lack specific information on optimum habitats and conditions that provide for lynx and their prey in western Montana (Ruggiero and McKelvey 1999), an intensive lynx study is currently being conducted in the Seeley Lake area approximately 20 miles to the north of the Analysis Area. From this research, it has been found that lynx generally occur between 1,200 m and 2,100 m in elevation in forests dominated by mesic mixed forest composed primarily of Douglas-fir, western larch, and lodgepole pine at lower elevations and subalpine fir, whitebark pine, and Engelmann spruce at upper elevations (Aubry et al. 1999). The primary prey species of lynx are snowshoe hares and habitat use occurs predominantly in early to mid-successional stands that produce high densities of hares. Lynx also appear to avoid openings with little cover or foraging opportunity (Aubry et al. 1999). Lynx denning habitat is less well documented, however denning stands are generally characterized as mature to old, subalpine fir and Engelmann spruce dominated stands on moist sites (north facing slopes) with moderate to high canopy closure (i.e. at least 50% canopy closure) and accumulations of coarse woody debris (i.e. at least 40 logs/50 m) that provide security and escape cover for kittens (Koehler 1990, Koehler and Brittell 1990).

Although within the elevation range of the species, the forest types found in the Project Area are dominated by warm, dry vegetation and stands composed primarily of dry Douglas-fir and ponderosa pine. These forest types are not preferred by lynx, and although some lynx occurrence has been noted in the literature within Douglas-fir and lodgepole pine forests, these areas have generally been associated with areas of boreal forest dominated by subalpine fir and Engelmann spruce (Aubry et al. 1999). More extensive Douglas-fir and lodgepole pine dominated forests are found to the north and northwest on private lands within the Analysis Area, however, the portion of the Analysis Area adjacent to the Project Area (i.e. within 0.5 miles) is dominated by dry ponderosa pine forest types not preferred by lynx. Therefore, it is not likely that lynx will effectively use the Project Area for breeding or foraging, although some transient occurrence is possible.

Flammulated Owl
Flammulated owls occur mostly in mid-elevation conifer forests that have a significant old ponderosa pine component. They are known to occur on the Lolo National Forest in mature Douglas-fir/Ponderosa pine forests (Verner 1994). Flammulated owls appear to select open forest stands with large trees and snags for nesting and foraging (many authors cited in McCallum 1994). In addition, use areas have been found to have occasional clusters of thick vegetation for roosting (Howie and Ritchey 1987), and adjacent grassland or xeric shrubland openings that create edge foraging habitat (Wright 1996). Flammulated owls are secondary cavity nesters, usually utilizing cavities excavated by pileated woodpeckers in larger conifer trees (cited in McCallum 1994). Flammulated owls are insectivorous and utilize foraging techniques adapted to open forest conditions or forest/grassland edge habitats (cited in McCallum 1994).

Flammulated owls are unlikely to occur within the Project and Analysis Areas due to the low availability of mature/old ponderosa pine/Douglas-fir stands. Within the Project Area there are approximately 4 large trees (>21" dbh) per acre, of which 3 are ponderosa pine. The Project Area is composed of 365 acres of proposed harvest in three patches and is dominated by relatively dense, even-aged, intermediate sized (10-14" dbh), second growth Ponderosa pine/Douglas-fir forest.

Pileated Woodpecker
Pileated woodpeckers likely occur within the Project and Analysis Areas. Pileated woodpeckers prefer mature and old growth conifer forest with a canopy dominated by large western larch or ponderosa pine. Mature aspen and cottonwood stands are also used by pileated woodpeckers. Pileated woodpeckers typically do not nest in trees less than 15" dbh, and preferred trees are generally over 20" dbh. Sufficient large snags and coarse woody debris are important components of pileated woodpecker habitat.

The Project Area has stand structure suitable for pileated woodpecker foraging use. However, the paucity of large trees, the low density of large snags, and the limited amount of downed woody debris result in relatively low quality habitat for foraging. The Project Area is dominated by medium-sized Douglas-fir/ponderosa pine with relatively few scattered large trees or snags, resulting in relatively poor nesting habitat for pileated woodpeckers. Large cottonwood trees along the lower reaches of the riparian areas may provide some level of potential nesting and foraging habitat, however these areas are relatively small and not connected to high quality pileated woodpecker foraging habitat.

Boreal Owl Boreal owls prefer mature spruce/fir forests dominated by Englemann spruce. In these forest types, subalpine fir, Douglas-fir, western larch and lodgepole pine can also be well-represented species (Hayward et al. 1987). Boreal owls tend to be confined to cool sites at elevations greater than 5,200 feet in elevation (Hayward et al. 1987). Elevations on this Project Area range from about 3,500-4,800 feet, which is generally below boreal owl habitat. In addition, mature and over mature spruce/fir habitats are virtually non-existent within the Project and Analysis Areas. Forest conditions in the Project Area are warmer and drier than those typically preferred by

boreal owls. Therefore, the treatment sites involved in this project do not provide conditions normally considered suitable for boreal owls.

Fisher
Fishers prefer densely forested riparian old growth forests that have an abundance of coarse woody debris and large snags (≥30" dbh)(cited in Powell and Zielinski 1994). They also tend to use moist forest types at mid- to low elevation with mature to old forest structure (cited in Powell and Zielinski 1994). Although the Project Area is at low elevation, the stands are generally composed of warm, dry vegetation dominated by mid-successional ponderosa pine and dry Douglas-fir cover types, which are generally not considered high quality fisher habitat. Riparian areas within the Project Area are generally small, with forest cover generally lacking structures important for fishers. Therefore, the potential for use by fishers is low.

Black-backed Woodpecker
Black-backed woodpeckers are closely associated with standing dead forests, created by large fires of high intensity (Hutto 1995). Burned forests tend to be used soon after fire events occur (~2-5 years), and large, densely stocked stands with an abundance of large trees of various species appear to provide the greatest benefit to black-backed woodpeckers (Heijl et al. 2000, Hitchcox 1996). Black-backed woodpeckers are also found in green forests with high levels of insect activity (Goggans et al. 1989). Black-backed woodpeckers are not migratory, but are known to undertake large movements in response to fire events. Therefore, the Analysis Area used for the grizzly bear assessment will be used for the black-backed woodpecker cumulative effects analysis.

No recent stand-replacement fires or major insect infestations are known to occur within the Analysis Area. The Ryan Gulch fire, which occurred in 2000 and covered approximately 16,000 acres is located just outside the Analysis Area to the southeast (approximately 10 miles from the Project Area). This large fire event likely increased black-backed woodpecker populations, although some salvage activity has occurred in this area on DNRC lands. However, it is unlikely that this large fire would equate to an increase in use by black-backed woodpeckers in the Project Area due to the fact that no burned habitat or insect infestations are known to occur there. Consequently, black-backed preferred woodpecker habitat is rare to non-existent in the Analysis Area and the likelihood of resident populations of black-backed woodpeckers is very low.

Peregrine Falcon
Peregrine falcons were de-listed from Threatened Species status under the ESA in 1999, but it is maintained as a DNRC sensitive species. In Montana, peregrine falcons typically nest in areas with large rock and cliff features. Foraging habitats are usually open areas such as marshes, estuaries and croplands. A small amount of such croplands (hay fields and grazing lands) occur within the Analysis Area, and the Clark Fork River and associated wetland complexes would likely provide a moderate level of foraging habitat. Although minor rock outcroppings occur within the Analysis Area, preferred nesting cliffs are generally not available. Suitable cliff features likely do occur along the Clark Fork River to the east outside of the Analysis Area. From a check of the Montana

Natural Heritage Database, no nesting pairs of peregrine falcons are known to exist within the Analysis Area. Due to the lack of adequate nesting habitat, it is not likely that nesting peregrine falcons would occur within the Project or Analysis Area.

Big Game

Densely stocked thickets of conifer regeneration and overstocked mature stands provide thermal protection and security for elk and deer in winter, which can reduce energy expenditures and stress associated with cold temperatures, wind, and human-caused disturbance. Although thermal cover attributes may be less important for elk than has been thought (Cook et al. 1998), areas with densely stocked mature trees are also important for snow interception, which makes travel and foraging less stressful during periods when snow is deep. Dense stands that are well connected provide for animal movements across wintering areas during periods with deep snow, which improves their ability to find forage and shelter under varied environmental conditions. Thus, removing this "winter cover" important to wintering elk and deer through forest management activities can increase their energy expenditures and stress in winter. Reductions in cover could ultimately result in a reduction in winter range carrying capacity and subsequent increases in winter mortality within local elk and deer herds.

Timber harvest can increase elk vulnerability by changing the size, structure, juxtaposition and accessibility of areas that provide security during hunting season (Hillis et al. 1991). As visibility and human access increase within forested landscapes, elk have a greater probability of being observed and subsequently harvested by hunters. Hillis and others (1991) recommended that effective elk security should be composed of nonlinear blocks of mature forest cover (with at least 50% canopy closure) that are at least 250 acres in size and at least one half mile from any open road (Hillis et al. 1991). They also suggested that security cover is lacking if less than 30% of an area is composed of security cover and stated that maintaining connectivity among security areas is important (Hillis et al. 1991). Relationships of security cover and vulnerability for deer are not well known. However, because deer are less social than elk, and are smaller, they tend to use smaller patches of cover more effectively. It is generally assumed that if the security cover needs of elk are met, then those of deer are also met. Further, when elk security is demonstrated to be substantially compromised, adverse effects to deer can also be expected (albeit to a lesser degree than for elk). As with elk, affects on deer populations are skewed towards the male segment of the population with regard to security.

The proposed harvest unit provides some habitat for deer, moose, and elk. Due to the large ranges of elk and the seasonal shifts in habitat use in this area, the area described in the grizzly bear analysis was used for assessing cumulative effects. Although deer and elk winter in the Project Area, it is not considered a key winter range and does not winter large concentrations of big game. In the Analysis Area, deer and elk tend to winter higher on the south facing slopes at the upper end and above the Project Area (Mike Thompson, Montana FWP, pers. com., 29 March 2002). Elk security, as defined by Hillis et al. (1991) is limited and quite fragmented in the Analysis Area. The Analysis Area is dominated by private commercial forestlands that are heavily roaded and dominated by early successional types, which has resulted in limited amounts of security

habitat. Scattered parcels of state and federal lands would qualify as security cover, however these areas are generally spatially separated from the Project Area. Security is provided in the area immediately around the Project Area due to the location of occupied small private lands along the main access points to the Project Area, which results in very secure access closures and a resultant improvement in security for deer and elk.

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CHAPTER IV

ENVIRONMENTAL EFFECTS

Introduction

This chapter describes the environmental consequences or effects of the proposed action and the cumulative effects of past and present actions and future state activities within the analysis area.

WATER QUALITY

No Action Alternative:

Under the No Action Alternative, existing roads and associated BMPs would continue to protect soil and water resources, provided routine maintenance is upheld.

Action Alternative:

Harvest units can directly impact water quality if not properly located or buffered. The risk of impacts is greatest along streams, wetlands and lakes. The SMZ Law regulates forest management activities that occur adjacent to streams, lakes or other bodies of water. All proposed activities would be conducted in accordance with the SMZ law and Rules. All areas requiring SMZ delineation have been field reviewed by a DNRC Hydrologist to determine their adequacy in meeting the requirements of the law and satisfying the SFLMP guidance to protect water quality and aquatic resources.

Portions of the sale area are drained by ephemeral draws, swales and wet areas that lack discernable stream channels. Equipment restrictions and designated crossings would be utilized to protect all wet areas and ephemeral draws.

The primary risk to water quality is associated with roads, especially roads constructed along or crossing streams. DNRC would utilize all reasonable mitigation and erosion control practices during any new construction, reconditioning or reconstruction of all roads, stream and draw crossings. Site-specific design recommendations from DNRC Hydrologist and Soil Scientist would be fully implemented under the action alternative.

Under the DNRC proposal, up to 3,800 feet of new roads would be constructed to access the sale area. Approximately 1,000 feet of these roads are temporary in nature and would be built with minimal design and excavation. The remaining 2,800 feet of permanent road would be constructed to BMP standards designed to protect water resources and minimize additional long-term impacts. Following the State's harvest activities, the temporary roads would be closed through ripping, seeding and slashing of the road surface. The measures are expected to reduce public use and reduce sediment erosion and delivery potential to adjacent stream channels and draw bottoms.

Cumulative Effects on Water Quality:

Proper application of BMPs and site-specific designs and mitigation measures would reduce erosion and potential water quality impacts to an acceptable level as defined by the water quality standards. Acceptable levels are defined under the Montana Water

Quality Standards as those conditions occurring where all reasonable land, soil and water conservation practices have been applied.

The proposed harvest activities are not expected to increase sediment yield to stream channels. This is largely due to the location of the proposed harvest units along the landscape and mitigation designed to minimize erosion.

Erosion control measures and other mitigation measures are expected to minimize long term impacts to downstream water quality and beneficial uses. There is little risk of measurable adverse impacts to downstream water quality and beneficial uses occurring as a result of the proposed action alternative.

CUMULATIVE WATERSHED EFFECTS

No Action Alternative :
The No Action Alternative would maintain measurable cumulative effects from past management activities however, as hydrologic recovery continues to occur it is reasonable to assume that these effects would decline.

Action Alternative:
Results from the ECA/WY analysis show that projected harvest levels are below those levels normally associated with detrimental water yield increases and thus channel impacts. Expected water yield increases over current conditions resulting from the proposed activities are 0.6% for the Turah Creek watershed and 2.6% for Unnamed Tributary #1. Unnamed Tributary #2 is outside of the project area. The watershed divide falls just inside of the northwest corner of the state section. Drainage to this stream channel from the state section is provided by ephemeral draws. Table 4-1 below summarizes predicted increases in water yield and ECA following the proposed activities for each affected watershed.

TABLE 4-1.

TURAH CREEK PROPOSED TIMBER SALE
Watershed Proposed Activities ECA/WYI Analysis

Watershed	Proposed Harvest	Proposed Roads	Proposed ECA	Cumulative ECA	Proposed WYI	Cumulative WYI*
Turah Creek	100 ac.	.72	34 ac.	452 ac.	0.6%	12.7%
Unnamed # 1	177 ac.	0	59 ac.	124 ac.	1.8%	7.4%
Unnamed # 2	28 ac.	0	9 ac.	170 ac.	0.3%	8.0%

* Water Yield Increase (WYI) is an estimate of percent water yield over natural levels due to management activities.

Estimated increases in average annual water yield due to timber harvest in Turah Creek are below thresholds set by DNRC. It is unlikely that the proposed levels of harvest would contribute to detectable increases in water yield or have any measurable influence on downstream channel conditions.

Quality Standards as those conditions occurring where all reasonable land, soil and water conservation practices have been applied.

The proposed harvest activities are not expected to increase sediment yield to stream channels. This is largely due to the location of the proposed harvest units along the landscape and mitigation designed to minimize erosion.

Erosion control measures and other mitigation measures are expected to minimize long term impacts to downstream water quality and beneficial uses. There is little risk of measurable adverse impacts to downstream water quality and beneficial uses occurring as a result of the proposed action alternative.

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* Water Yield Increase (WYI) is an estimate of percent water yield over natural levels due to management activities.

Estimated increases in average annual water yield due to timber harvest in Turah Creek are below thresholds set by DNRC. It is unlikely that the proposed levels of harvest would contribute to detectable increases in water yield or have any measurable influence on downstream channel conditions.

Only minor detectable increases in water and sediment yield are anticipated in the areas outside of the Turah Creek watershed as a result of the proposed harvest. Increases in sediment yield are expected to be negligible due area treated, location along the landscape, and mitigation designed to minimize erosion.

COLD WATER FISHERIES

No Action Alternative:
The No Action Alternative would continue to impact cold-water fisheries habitat through erosion and sedimentation due to existing road locations and the current grazing strategy.

Action Alternative:
There are no documented fish bearing streams draining the state sections within the proposed sale area. Cable harvesting, application of the SMZ Law, no planned SMZ harvest, and additional BMP mitigation is expected to minimize impacts to perennial stream channels. Due to planning and associated mitigation, it is unlikely that the proposed timber sale will affect large woody debris recruitment, shade or in-stream temperature into fish-bearing streams.

Cumulative Effects on Fisheries:
The action alternative does not include any new stream crossings along fish bearing streams. The one proposed stream crossing is along an intermittent tributary, which would not support fish. The proposed new roads do not cross or run adjacent to any existing stream channels. Mitigation designed to close and stabilize specific road segments is expected to reduce the risk long-term potential impacts to the affected stream channels.

SOIL RESOURCES

No Action Alternative:
The No Action Alternative would have minimal effects on soil resources. Existing roads would require routine maintenance to help reduce potential impacts.

Action Alternative:
Soils within the proposal area are fairly resilient and rocky, however skidding activities, slash disposal and site preparation can cause rutting, erosion, soil compaction and displacement. Potential for soil impacts are greater on tractor units on slopes over 45%. On tractor units, the area of detrimental impacts should be limited to 15% or less of the overall harvest area. These impacts would be minimized by the implementation of mitigation measures to include season of use restrictions, slope limitations for ground skidding and skid trail planning. Units that would be cable yarded would have negligible effects on soils. Burning would have a short-term beneficial effect on soil nutrient

cycling. Retention of coarse woody debris on site would have a long-term beneficial effect on soil nutrient cycling.

To minimize ground skidding effects and soil disturbance, skidding activities would be pre-planned and limited to dry or frozen soils on slopes less than 45 percent. Slopes over 45 percent would be cable yarded. These activities would be monitored by the sale administrator during operations. Adequate drainage followed by grass seeding on temporary roads and heavily disturbed segments of skid trials would help reduce potential on-site erosion.

Cumulative Effects to Soil Resources:
Cumulative effects could occur from repeated entries and overlapping effects in the harvest area. There has been previous ground based timber harvest in portions of all sections. Main skid trails and landings are still apparent in some spots, but most have revegetated and soil impacts are estimated to be less than 10% of stands where previous harvest occurred.

Implementing the mitigation measures with the action alternative presents low risk of cumulative effects by limiting the area of adverse soil impacts. Future harvest opportunities would likely use the same road system, skid trails and landing sites to reduce additional cumulative impacts. Large woody debris and a majority of fine slash/needles would be retained for nutrient cycling to maintain long-term soil productivity. This is expected to maintain long-term soil productivity and reduce on-site erosion.

NOXIOUS WEEDS

No Action Alternative:
Under the No Action Alternative, weed seed is expected to continue to be spread by vehicle traffic, wind and animal dispersion into the project area, which would result in competition with native species trying to establish in the recently disturbed area.

Action Alternative:
Ground disturbing activities associated with the proposed action alternative have the potential to introduce or spread noxious weeds in susceptible habitat types. Noxious weed spread would be greater under the Action Alternative than the No Action Alternative due to decreased tree canopy and shade and also the increased soil disturbance from equipment. DNRC would follow an integrated weed management approach to help prevent the introduction and establishment of noxious weeds and slow the expansion of existing weeds.

Cumulative Effects of Noxious Weeds:
Invasion and spread of noxious weeds could decrease soil productivity and stability and reduce the reestablishment of native species. Promoting a vigorous forest provides shading that should reduce noxious weed levels over the long term, although more species of weeds may occur. A combination of prevention, revegetation and monitoring

would be implemented to reduce the possible infestation and spread of weeds associated with this project. DNRC would emphasize control of new weed infestation, such as toadflax. Herbicide treatment may be used for selected sites.

VISUAL QUALITY

No Action Alternative:
Under the No Action Alternative no road building or harvesting would take place. There would be no immediate change to visual quality. Since the stand would remain in an overstocked condition it would remain at high risk to pine beetle infestation and high intensity stand replacing fire. Either of these events, particularly stand replacing fire could have a very noticeable impact on visual quality at some point in the future.

Action Alternative:
Approximately 0.5 miles of new permanent roads would be built with this project. This road would remain in place but would be closed to all traffic. Approximately 0.2 miles of temporary road requiring little or no excavation would also be built on state and adjacent private land to access landing areas. Following their use these roads would be reclaimed.

The commercial thinning proposed for the area would maintain a forested far view appearance. When the ground is snow covered, the portions of harvest units over approximately 35% slope may appear as a mottled white and green as opposed to the solid green look of a forest with a closed tree canopy. From within the harvest units the area would appear much more open than it currently is and sight distances would be increased. Since the stand has been overstocked for a number of years and the smaller trees are to be removed the remaining trees will have few if any low live limbs and have a somewhat unnatural appearance immediately after harvest, some individuals may find this to be a negative aesthetic impact. The lower limbs of even dominant trees in overstocked stands frequently grow upwards in an attempt to be exposed to more sunlight. After the stand is thinned these upward angled branches can appear somewhat unusual giving the tree a spindly appearance. Following thinning more sunlight is available to the tree from the side and the angle of a tree's branches will lower themselves to capture this sunlight. This gives the tree's crown a longer appearance in the years following thinning with the tree gradually losing its spindly appearance. Crowns of the trees will also grow into spaced previously occupied by the harvested trees. This will gradually increase the density of the remaining tree's crowns and the canopy cover of the stand.

All ground based harvesting would be done with a cut to length harvesting system. This system allows for long skid distances and reduces the need for as much road as is required with conventional logging systems. In this system trees are delimbed at the stump and all equipment operates on a mat of slash. This greatly reduces soil scarification and rutting that can otherwise occur on skid trails. Slash that is on the skid trails is crushed flat on the ground.

Skyline corridors from skyline logging in the southeast corner of the section would be visible as narrow(10-15 foot wide) clearcut stripes running in perfectly straight lines up and down the slope. These corridors are most visible if viewed when aligned with the corridor. As the viewpoint moves to either side, trees adjacent to the corridor screen it from view. If the stand adjacent to the corridor is thinned so that the canopy is not continuous, the corridors do not appear as abrupt as they would if they passed through a dense portion of the stand that has not been thinned, however corridors can be noticeable even in thinned stands for several years. Corridors in this particular area would be oriented so that they do not align themselves with common viewpoints. This would reduce their visual impact.

In summary, the limited amount of new permanent roads, a harvest prescription that leaves 40-65 of the largest trees per acre, use of a cut to length logging system that includes a forwarder, minimizing the width of skyline corridors and aligning them away from common viewpoints would result in small or no negative visual impact in the short term. Aesthetic quality would improve in the long term as the trees in the stand increase in size and their crowns expand.

AIR QUALITY

No Action Alternative:
Under the No Action Alternative there would be no burning of logging slash and no effect on air quality.

Action Alternative:
365 acres of logging slash with approximately 10 tons per acre could be burned as part of this project. Most of this slash would consist of needles, branches and small stems less than 5 inches in diameter. Slash would be placed into small compact piles that are free of dirt.

Burning may be conducted in the spring or fall season depending on weather and fuel conditions. Burning would be done when the piles are relatively dry inside but the layer of duff on the forest floor surrounding the piles is moist or snow covered and the fire would not be able to burn between piles. Atmospheric conditions are much better for smoke dispersion in the spring, however there are days in the fall that would also allow for good smoke dispersion.

It is important that fire not be able to spread and smolder between piles as fire that smolders in the duff has the potential to produce smoke over a longer period of time with a higher rate of emissions per pound of fuel than fuel that burns with flaming combustion.

Due to the potential impact that this amount of smoke could cause on air quality it would be vital to be very selective in choosing a day to ignite the burn. Strong west winds would be ideal. This would disperse smoke to the east, away from the Missoula Valley.

East winds would be undesirable, as this would move smoke directly into the Missoula Valley and the Bonner area. Calm winds would allow the smoke to settle into the Clark Fork valley and drift towards Missoula if stable atmospheric conditions were present. Burning would only be conducted under good to excellent smoke dispersion conditions. Piles would be burned as dry as possible and would be kept free of dirt. DNRC would work closely with the Monitoring Unit of the Montana/Idaho Airshed Group and obtain special smoke dispersion forecasts in order to burn only on ideal days. Only a handful of days each year meet the conditions that are necessary to conduct this burn with the desired results and not have adverse air quality impacts. This may require that slash remain unburned in the unit for longer than normal until the right conditions are present.

With proper smoke management, impacts to air quality should be minor and short in duration.

Cumulative Effects on Air Quality

Smoke resulting from this project would have a cumulative effect with other prescribed burns being conducted in the region as well as with pollutants produced from other sources. Smoke produced in Montana and Idaho from prescribed burning is regulated by the smoke monitoring unit. The cumulative impact of all burning is considered in issuing burning restrictions. Industrial, agricultural and vehicular sources of particulate would also be producing pollutants while burning is ongoing. With attention to burning under only ideal conditions, the projects cumulative impact to air quality should be minor and of short duration.

NATURAL FOREST CONDITIONS

No-Action Alternative:
Under the No Action Alternative no harvesting would take place. The stand would remain in its current dense condition. Trees would gradually thin out as they die from competition stress and insect attack. The more shade tolerant Douglas-fir would increase at the expense of ponderosa pine. The stand would remain at high risk for high intensity stand replacing wildfire due to the dense stand structure and increasing fuel load from dieing trees.

Action Alternative:
Under the Action Alternative 365 acres would be harvested with a commercial thinning. Currently the stand has 134 trees per acre over 7.0" DBH. Average diameter is 12". Basal area is 116 square feet per acre. This harvest would retain 40 to 65 of the most dominant trees per acre on the site. This would equate to 45 to 70 feet of basal area per acre. Ponderosa pine would be favored to leave over Douglas-fir. Species composition after harvest would be roughly 90% ponderosa pine and 10% Douglas-fir. These percentages approximate what would have been present on the site under pre-settlement conditions. Trees left would range from 10" DBH to 26" DBH and would average around 14". This may be smaller than the pre-settlement era trees that would have been

present on the site. However the remaining trees should grow at a greatly increased rate after thinning, averaging 2 inches of diameter growth per decade for at least the next 20 years, at that time another harvest may be called for. Ponderosa pine would be favored for leave trees and most ponderosa pine over 21" dbh would be retained Within the Project Area, there are approximately 3 ponderosa pine trees/acre over 21" dbh, of which approximately 1 would likely be harvested. An additional 2 ponderosa pine trees/acre from 19 to 20" dbh would be retained, therefore approximately 80% of the largest ponderosa pine trees would be maintained post harvest. When all large trees are considered, only approximately 12.5% (1 ponderosa pine over 19" dbh harvested/5 existing ponderosa pine and 3 existing Douglas-fir over 19" dbh retained) would be harvested under the Action Alternative. With thinning, the stand would be closer to its pre-settlement condition than it would be without any harvest. Removal of understory and suppressed trees would give the stand an open nature, similar to what would have been present with the frequent low intensity fire regime that likely existed on this site prior to organized fire suppression.

WILDLIFE

Threatened and Endangered Species

Bald Eagle

No-Action Alternative:

If no harvest were to occur in the Project Area, suppressed and co-dominant trees would continue to compete with dominant trees, reducing overall stand vigor, increasing the risk of mortality to large trees. In the short term (10-20 years), this competition may result in the creation of small to medium sized snags and coarse woody debris, however, loss of the few existing large trees would increase over time and the increasing risk of insect infestation and resultant stand level fire disturbance could result in reduced stand structure.

From the standpoint of cumulative effects, harvesting and human development on adjacent private lands within the Analysis Area has removed structural features important to bald eagle nesting habitat, resulting in an Analysis Area with very limited habitat conditions conducive to use by nesting bald eagles. Consequently, the low likelihood of use by nesting bald eagles results in no cumulative effects resulting from selection of the No-Action Alternative in the short term, with only minor potential effects in the long term if fire disturbances resulting from conditions within the Project Area were to affect the limited amount of potential nesting habitat in the Analysis Area.

Action Alternative:

If the proposed harvest activities are implemented, suppressed and co-dominant trees would be removed, resulting in reduced competition within the stand and increasing the vigor of residual trees. Ponderosa pine would be favored for leave trees and most ponderosa pine over 21" dbh would be retained. Within the Project Area, there are approximately 3 ponderosa pine trees/acre over 21" dbh, of which approximately 1 would likely be harvested. An additional 2 ponderosa pine trees/acre from 19 to 20" dbh would

be retained, therefore approximately 80% of the largest ponderosa pine trees would be maintained post harvest. When all large trees are considered, approximately 12.5% (1 ponderosa pine over 19" dbh harvested/5 ponderosa pine and 3 Douglas-fir over 19" dbh retained) would be harvested under the Action Alternative. Consequently, there would be some minor negative effect on potential bald eagle nesting habitat in the short term resulting from the removal of a small proportion of the largest ponderosa pine trees in the Project Area. Decreasing the risk of stand level disturbances in the future would benefit bald eagles over time as stands develop greater structural complexity and a higher proportion of large trees for potential use by bald eagles.

Disturbance resulting from timber harvest activities (machinery operation, tree falling, etc.) can affect bald eagles in nesting sites and winter concentration areas (MBEWG 1991). However, known nest sites are too distant (over 2.5 miles) to be negatively affected by harvest activities on the Project Area and no known winter concentration or communal roosting sites are located within the Analysis Area. Although bald eagles would likely forage and winter within 0.5 miles of the Project Area, any affects from timber harvest disturbance would be minimal and ephemeral, resulting in only minimal potential effects to bald eagles.

No additional near future Trust Land Management projects are planned within the Analysis Area and harvesting on adjacent private lands is likely to be rare over the short term (10-30 years) due to the existing low merchantable stocking levels that have resulted from intensive past harvesting. In summary, there would be minimal direct and cumulative effects to bald eagles as a result of implementation of the proposed harvest, with the potential for some minor positive indirect effects due to improving stand vigor and reducing stand replacing fire disturbance potential over the long term.

Grizzly Bear

No-Action Alternative:

If no harvest were to occur within the Project Area, no new roads would be constructed resulting in no change in human access to potential grizzly bear habitats. Cover would not be reduced over the short term, however the continued reduction in stand vigor resulting from competition could increase the risk of insect and disease infestations, potentially resulting in a stand replacing fire event that could reduce cover values. However, the high road densities (>3 miles/sq. mile) on private lands dominating the Analysis Area, the low quality of seasonal habitats within the Project Area, the close proximity of human development, and the relative isolation of the Project and Analysis Areas between major highway and interstate corridors greatly reduces the likelihood of use by grizzly bears.

From a cumulative effects standpoint, adjacent private lands would likely continue to be managed intensively for timber production, resulting in continued high road densities and low cover availability. Continued development is also likely on private lands within the interstate corridor which will likely father reduce habitat values for grizzly bears. Therefore, under the No-Action Alternative, habitat would continue to be of low quality, with the potential for continued reductions. However, these cumulative effects would be

minimal due to the low quality of existing habitat and the consequent low potential for grizzly bear use.

Action Alternative:
Implementation of the Action Alternative would result in increased road density and decreased cover. A total of approximately 0.82 miles of new road would be constructed to access the Project Area. However only approximately 0.5 miles of this road would be permanent, with approximately 0.20 miles of temporary road being constructed that would be obliterated (i.e. ripped, seeded, and slash piled on the road surface) after completion of the harvest activities and 0.12 miles of road that would be reconstructed from an existing road. All new road would be closed to public access after completion of the harvest. Cover would be reduced, however the moderate levels of retention would provide some screening cover within the Project Area. Consequently, implementation of the Action Alternative would result in minimal risk to grizzly bears due to the minor level of effects within the Project Area, the very low quality of existing habitat and the consequent low potential for grizzly bear use resulting from the existing high road densities (>3 miles/sq. mile) on private lands dominating the Analysis Area, the low quality of seasonal habitats within the Project Area, the close proximity of human development, and the relative isolation of the Project and Analysis Areas between major highway and interstate corridors.

From a cumulative effects standpoint, continued intensive management of adjacent private lands for timber production, resulting in continued high road densities and low cover availability coupled with continued human development on private lands within the interstate corridor will continue to reduce habitat values for grizzly bears. Therefore, implementation of the Action Alternative would have minimal cumulative effects on grizzly bears as habitat would continue to be of low quality, with the potential for continued reductions, and the likelihood of use by grizzly bears would continue to be low.

Gray Wolf
No-Action Alternative:
If no harvest were to occur in the Project Area, there would be no changes in cover or road density. Although cover and road density can influence the potential for indirect effects on wolf mortality, the primary concern would be related to affects on big game populations in the Analysis Area. Not implementing the Action Alternative would have some minor benefit on wolf prey base, however the high road densities within the Analysis Area, the lack of large concentrations of big game that would be a potential focus of wolf activity, and the dispersed yet extensive human development in the area immediately around the Project Area would greatly reduce the value of this area for wolves. Therefore, there would be a very low likelihood of use by wolves and consequently minimal to no effects on wolves from selection of the No-Action Alternative.

From a cumulative effects standpoint, the area around the Project Area is dominated by private commercial forestland that is managed intensively for timber production. This

has resulted in high road densities within the Analysis Area and low cover values resulting from the dominance of early successional forest types. In addition, small private land holdings along the Interstate corridor will likely continue to be developed for human use, resulting in some negative effects to wolf habitat. However no additional cumulative effects on wolves would be anticipated as a result of selecting the No Action Alternative.

Action Alternative:
Implementation of the Action Alternative would result in reductions in cover and increases in road density. However this would have minimal effects on wolves since big game populations (i.e. wolf prey sources) are not likely to be greatly affected, all roads would be closed to public access after harvest, and the dispersed but intensive human development in the area immediately adjacent to the Project Area would greatly reduce the potential for extended use of this area by wolves.

Cumulative effects resulting from the Action Alternative would be minimal to non-existent due to the low likelihood of use by wolves as a result of the existence of high road densities and low cover values on private lands dominating the Analysis Area, the lack of key big game winter range in the area, and the relatively minimal incremental change in cover and road density resulting from the Action Alternative. Proposed activities on the Project Area would only minimally influence these conditions and hence there is little to no potential cumulative effect on wolves from implementing the Action Alternative. In addition, small private land holdings along the Interstate corridor will likely continue to be developed for human use, resulting in the potential for negative effects to wolf habitat. However, activities within the Project Area would not likely influence these conditions and hence there is no cumulative effect on wolves.

Lynx
No-Action Alternative:
The forest conditions in the Project Area would not generally be considered lynx habitat and consequently there is a very low likelihood of lynx occurrence. Therefore, no direct, indirect, or cumulative effects are likely on lynx if the No-Action Alternative were selected.

Action Alternative:
The forest conditions in the Project Area would not generally be considered lynx habitat and consequently there is a very low likelihood of lynx occurrence. Therefore, no direct, indirect, or cumulative effects are likely on lynx if the Action Alternative were selected.

Flammulated Owl
No-Action Alternative:
Without the proposed thinning harvest, ponderosa pine would continue to experience competition with encroaching Douglas-fir, leading to potentially accelerated mortality of the largest size class of ponderosa pine. This would create additional nesting habitat for flammulated owls in the short term (i.e., several decades), but lead to long term deficits in nesting habitat due to the failure of smaller size classes to grow into larger size classes,

especially for ponderosa pine. In addition, foraging habitat would continue to decline as tree density remains high. Therefore, selection of the No-Action Alternative would have minor positive short term effects and minor long term negative effects on flammulated owls.

From a cumulative effects standpoint, intensive harvest on private lands has generally eliminated potential flammulated owl habitat. Residual mature and old forest types on federal and state lands, which are separated by considerable distance in many portions of the Analysis Area, are generally fragmented by these early successional types. If no harvest occurs, low quality flammulated owl habitat would be retained but there would be a continued, and potentially increasing risk of stand replacing wildfire which, depending on the severity of any future fire, could remove habitat for flammulated owls for an extended period of time (>100 years).

Action Alternative:

The proposed harvest activities are designed to reduce competition from encroaching Douglas-fir on historically ponderosa pine dominated sites. Removal of primarily suppressed, and sub-dominant trees, would open forest stands, creating better foraging conditions for flammulated owls. Removal of dense, small tree patches in the Project Area could affect roosting habitat, however, retention along riparian areas and leave areas with no harvest would provide potential roosting habitat. Ponderosa pine would be favored for leave trees and most ponderosa pine over 21" dbh would be retained. Within the Project Area, there are approximately 3 ponderosa pine trees/acre over 21" dbh, of which approximately 1 would likely be harvested. An additional 2 ponderosa pine trees/acre from 19 to 20" dbh would be retained, therefore approximately 80% of the largest ponderosa pine trees would be maintained post harvest. When all large trees are considered, only approximately 12.5% (1 ponderosa pine over 19" dbh harvested/5 existing ponderosa pine and 3 existing Douglas-fir over 19" dbh retained) would be harvested under the Action Alternative. Consequently, there would be some minor negative effect on potential flammulated owl nesting habitat in the short term resulting from the removal of a small proportion of the largest ponderosa pine trees in the Project Area. However, snags that are not a safety hazard would be retained and removal of smaller, suppressed, trees should also result in increased vigor in the retained trees, thereby increasing recruitment potential into the large tree class over time. Finally, reducing stem density would create more open forest conditions that would be more preferred by flammulated owls for foraging.

The proposed harvest activity would reduce the risks of disease, insect, and wildfire disturbances, returning these stands to more historical conditions. Thinning the smaller trees while retaining the large trees would decrease competitive stress on the remaining large trees, especially ponderosa pine, while encouraging medium-sized trees to grow larger and serve as long term replacements to the largest tree cohort. Although this may reduce tree density and roosting habitat conditions in the short term, by slowing the mortality of large ponderosa pine trees and removing some larger trees in areas of high density, proposed treatments would provide more stable, higher quality (i.e. better

foraging habitat with retention of most nesting and roosting habitat) conditions within the harvest units over the long term. Consequently, implementation of the Action Alternative would result in positive effects to flammulated owls overall, although some minor negative direct effect would be expected from the removal of a small proportion of the largest ponderosa pine trees within the Project Area.

From a cumulative effects standpoint, suitable flammulated owl habitat is limited in the Analysis Area due to intensive harvesting on private lands that has created early successional, types not suitable for flammulated nesting activity, and the effects of fire suppression which have increased stand density within historically open ponderosa pine stands. Therefore, the proposed treatment would improve flammulated owl habitat by improving foraging habitat, retaining most nesting structure, and retaining patches of denser structure in riparian and no-harvest areas that can serve as roosting habitat. In addition, reducing the risks of stand replacing disturbances would result in longer term stability of the suitable flammulated owl habitat. Consequently, there would be minor positive cumulative effects to flammulated owls by implementing the proposed Action Alternative.

Pileated Woodpecker

No-Action Alternative:

Without the proposed thinning harvest, ponderosa pine would continue to experience competition with encroaching Douglas-fir, leading to potentially accelerated mortality of the largest size class of ponderosa pine. This would create low amounts of additional nesting habitat for pileated woodpeckers in the short term (several decades) by the creation of large snags, but lead to long term deficits in nesting habitat due to the failure of smaller size classes to grow into larger size classes, especially for ponderosa pine. In addition, foraging habitat would be likely to increase over the short term as ponderosa pine and Douglas-fir trees continue to succumb, creating prey habitat (i.e. carpenter ants) in the resultant snags and coarse woody debris. However, over the long term, as the large tree component within the Project Area is removed and replaced with smaller size Douglas-fir, the existing low amount of nesting habitat would decline.

Under the No Action Alternative, there would be a continued, and potentially increasing, risk of stand replacing wildfire. Hutto (1995) found that pileated woodpeckers did occur in burned forests, but he suggested that they require a mix of forest types and they are generally always detected near intact forest. Therefore, stand replacing fire could result in an increase in foraging substrate, but lower long-term nesting suitability, which would be dependent upon the actual extent and intensity of the particular fire event, should one occur. In summary, short-term (several decades) nesting and foraging habitat conditions would be enhanced for pileated woodpeckers under the No Action Alternative, however, long-term (>50 years) sustainability of nesting habitat would be compromised due to expected high risk of attrition of preferred large ponderosa pine trees.

From a cumulative effects standpoint, pileated woodpecker habitat within the Analysis Area is limited due to ownership patterns that have created a landscape dominated by intensive harvesting over the past 20 years. Without harvesting, risks of long term

reductions in the large ponderosa pine component of proposed harvest stands would continue, as would risks of stand replacing wildfire. Although habitat may increase over the short term, there would be a long term cumulative effect to pileated woodpeckers as the remaining suitable habitats were reduced in value or eliminated over time.

Action Alternative:

Removal of large trees, especially ponderosa pine, within harvest units would affect potential habitat for pileated woodpeckers.

As previously mentioned in the "Natural Forest Conditions" section of this document, ponderosa pine would be favored for leave trees and most ponderosa pine over 21" dbh would be retained. Within the Project Area, there are approximately 3 ponderosa pine trees/acre over 21" dbh, of which approximately 1 would likely be harvested. An additional 2 ponderosa pine trees/acre from 19 to 20" dbh would be retained. Therefore, approximately 80% of the largest ponderosa pine trees would be maintained post harvest. When all large trees are considered, only approximately 12.5% (1 ponderosa pine over 19" dbh harvested/5 existing ponderosa pine and 3 existing Douglas-fir over 19" dbh retained) would be harvested under the Action Alternative. Consequently, there would be some minor negative effect on potential pileated woodpecker nesting habitat in the short term resulting from the removal of a small proportion of the largest ponderosa pine trees in the Project Area. Retention of snags, except when they present a safety hazard, would maintain foraging, roosting, and nesting habitat. Retention of areas with no or very little removal such as riparian and no-harvest areas would provide areas of denser trees, provide recruitment trees into the intermediate and large size classes, and protect snags and coarse woody debris that would function as nesting and/or foraging habitat.

The proposed harvest activity would reduce the risks of disease, insect, and wildfire disturbances, returning these stands to more historical conditions. Thinning the smaller trees while retaining most of the large trees would decrease competitive stress on the remaining large trees, especially ponderosa pine, while encouraging medium-sized trees to grow larger and serve as long term replacements to the largest tree cohort. Although this may reduce habitat quality in the short term by thinning dense forest structure preferred by pileated woodpeckers, over the long term it would provide more stable conditions within the harvest units by slowing the mortality of large ponderosa pine trees, and maintaining them in a condition of lowered risk.

From a cumulative effects standpoint, suitable pileated woodpecker habitat is limited in the Analysis Area due to intensive harvesting on private lands that has created early successional types not suitable for pileated woodpecker nesting activity. Treatment of the Project Area would reduce pileated habitat values by removing some intermediate and large trees, however the effect of these treatments is minimized by the retention of most large, preferred nesting trees, retention of snags, live cull, and coarse woody debris that would serve as nesting, roosting, and/or foraging habitat. In addition, reducing the risks of stand replacing disturbances would result in longer term stability of the suitable pileated woodpecker habitat. Consequently, there would be minor and short-term

negative and long-term positive cumulative effects to pileated woodpecker habitat by implementing the proposed Action Alternative.

Boreal Owl

No Action Alternative:

Preferred boreal owl habitat does not occur on the Project or Analysis Areas and therefore no direct, indirect, or cumulative effect would be expected from adoption of the No-Action Alternative.

Action Alternative:

Preferred boreal owl habitat does not occur on the Project or Analysis Areas and therefore no direct, indirect, or cumulative effect would be expected from adoption of the Action Alternative

Fisher

No-Action Alternative:

Without harvest, potential habitat would be maintained in its current condition, which is generally of low quality within the Project Area. However, there would be a continued, and potentially increasing risk of stand replacing wildfire which could reduce the small amount of potential habitat existing by creating early successional habitats with open canopy closure not preferred by fishers. Therefore, there would be no short term effects and the potential for minor long term adverse effects to fisher by selection of the No-Action Alternative.

Suitable fisher habitat within the Analysis Area is relatively limited outside of the proposed harvest parcels due to intensive harvesting on private lands and human development along the Clark Fork River corridor. Due to the limited habitat potential found in the Project and Analysis Area, no measurable cumulative impacts to fishers would be anticipated by selection of the No-Action Alternative.

Action Alternative:

Removal of canopy closure and structural complexity within harvest units would potentially affect the quality of fisher habitat. However, the low quality of the fisher habitat in the Project Area and the resultant low likelihood of use by fisher greatly reduces any potential effects. Turah Creek is the area most likely to be used by fishers within the Analysis Area and this area would not be entered during harvest activities. Retention of snags and coarse woody debris, large green cull trees, and most large (over 21" dbh) ponderosa pine trees would also benefit fishers by maintaining some level of structural complexity within the harvest units which provides habitat for fisher prey species as well as denning and resting habitats.

The proposed harvest activity would reduce the risks of disease, insect, and wildfire disturbances, returning these stands to more historical conditions. Thinning the smaller

trees while retaining most of the large trees would decrease competitive stress on the remaining large trees, especially ponderosa pine, while encouraging medium-sized trees to grow larger and serve as long term replacements to the largest tree cohort. Although this may reduce habitat conditions in the short term by reducing canopy closure and vertical structural diversity, over the long term it would provide more stable conditions within the harvest units and maintain the potential (albeit inherently low) for future use of the harvest areas by fishers. Therefore, the minor effects discussed above, when considered with the low quality of existing fisher habitat and the consequently low likelihood of use by fishers, would result in minor to no measurable effects to fisher or their habitat as a result of the proposed treatments.

Suitable fisher habitat is limited in the Analysis Area due to intensive harvesting on private lands that has created early successional types not preferred for fisher and human development along the Clark Fork River corridor. In the short term, the minor effects of the proposed treatments, when considered with the small amount of fisher habitat within the Analysis Area, result in no measurable cumulative effects to fishers from implementation of the Action Alternative. In the long term, the reduction in stand replacing fire risk within the Analysis Area as a result of implementing the proposed harvest would have some minor positive cumulative effect on fisher habitat.

Black-backed Woodpecker

No-Action Alternative:

Without harvesting, the existing stands and forest structure would be retained in their present condition, which is not preferred by black-backed woodpeckers so there would be no direct effect on black-backed woodpecker habitat. Over the long term, the increasing risk of stand replacing fire under the No-Action Alternative could result in increases in black-backed woodpecker habitat. In the event of a future fire event, the paucity of mature forest types in the Analysis Area as a result of timber management activities on private lands would result in a landscape dominated by post fire stands that would generally not be of high quality as preferred black-backed woodpecker habitat. However, there could be some minor indirect beneficial cumulative effect to black-backed woodpeckers as a result of the increased potential of stand replacing fire due to selection of the No-Action Alternative.

Action Alternative:

The proposed harvest units in the Action Alternative are not currently providing preferred black-backed woodpecker habitat, so treatment of these units would not directly affect black-backed woodpecker habitat. Harvest within the Project Area would likely decrease the risk of stand replacing fire, thereby reducing the potential for creation of future black-backed woodpecker habitat. Although the paucity of mature forest types in the Analysis Area as a result of timber management activities on private lands would result in a landscape dominated by post fire stands that would generally not be of high quality black-backed woodpecker habitat, there would be the potential for some minor adverse indirect cumulative effect due to decrease stand replacing fire risk in the Project Area.

Peregrine Falcon

No-Action Alternative:

Due to the lack of potential use of the forested types within the Project Area by peregrine falcons for nesting and foraging, and the fact that peregrines are not known to nest in the Analysis Area, there would be no direct, indirect, or cumulative effects from adoption of the No-Action Alternative.

Action Alternative:

Due to the lack of potential use of the forested types within the Project Area by peregrine falcons for nesting and foraging, and the fact that peregrines are not known to nest in the Analysis Area, there would be no direct, indirect, or cumulative effects from adoption of the Action Alternative.

OTHER SENSITIVE SPECIES

The following is an additional list of sensitive species that are known to occur, or could occasionally occur on State Trust Lands administered by the Southwestern Land Office. Due to limitations of available habitat, these species were determined to have a low likelihood of being adversely affected by this proposal or are not likely to occur in the vicinity of the activities proposed by the Action Alternative. Species occurrence records provided by the Montana Natural Heritage Program Database were also acquired and reviewed to document the presence or absence of these sensitive species in the Project Area vicinity. No impacts on any of these species are expected to occur as a result of the alternatives considered.

Coeur d' Alene Salamander - No availability of fractured rock associated with waterfalls or splash zones present within the Analysis Area. No known occurrences within the Analysis Area. Consequently, there would be no effect to Coeur d' Alene salamander habitat if either of the Alternatives considered were selected.

Common Loon - No lakes/ponds with adequate size or habitat values would be affected by the Action Alternative and no known occurrence of nesting common loons within the Analysis Area. Consequently, there would be no impacts to common loon by the Alternatives considered.

Harlequin Duck - Small sections of riparian habitat occur within the Project and Analysis Areas, however streams are very shallow with small substrate material and it is unlikely that harlequin ducks would occur within the Project Area. Hence there would be no effect from the Alternatives considered.

Mountain Plover - Shortgrass prairie habitats preferred by mountain plover do not occur within the Analysis Area. In addition, the proposed activities would have no effect on grassland habitats. No known local populations occur. Hence there would be no effect from the Alternatives considered.

Townsend's Big-Eared Bat - No known hibernacula occur in the area. No mines are known to occur on the Project Area, and no impacts to Townsend's big-eared bats would be expected to occur from either of the Alternatives considered.

Northern Bog Lemming - Bogs and fens are absent from the Analysis Area and substantial moss development does not commonly occur within the Project Area therefore there would be no effects to northern bog lemmings from either of the Alternatives considered.

Columbian Sharp-tailed Grouse - No known populations of Columbian sharp-tailed grouse occur in the area and grassland habitats are not affected by the proposed Action Alternative hence there would be no effects to the species from the Alternatives considered.

Ferruginous Hawk - dry grassland, sagebrush plains, and saltbush/greasewood flats are absent from the Analysis Area and no known nest sites of ferruginous hawks occur within the Project or Analysis Area. Therefore there would be no effects from the Alternatives considered.

Big Game

No-Action Alternative:

If the No-Action Alternative were selected, no new roads would be built and cover would not be reduced in the Project Area, thereby resulting in no effect to big game winter cover and security. Continued competition in the stand could ultimately result in stand replacing fire events that would reduce cover and increase vulnerability. However, the potential effects are minimal due to the fact that big game do not concentrate activity in the Project Area during the winter and vulnerability is low in this area due to the presence of occupied private residences near the main access points creating secure closures to public access.

From a cumulative effects standpoint, winter cover and elk security within the Analysis Area is limited due to intensive harvesting on private commercial forestlands surrounding the Project Area. Selection of the No-Action Alternative would have no direct cumulative effect on these conditions, but would be beneficial to resident elk and deer due to limited levels of security and escape cover at the landscape scale. However increased risk of fire disturbance as a result of tree competition within the Project Area could result in minor potential indirect cumulative effects in the longer term. The low value of this area for wintering big game and the lack of public access greatly reduce these potential indirect effects, should a burn occur.

Action Alternative:

If the Action Alternative were implemented, cover would be reduced in the Project Area, thereby resulting in potential reductions in big game winter cover. However, the current stand conditions in the Project Area do not provide high quality winter cover, riparian areas important to deer during severe winter conditions would not be treated, and big game do not concentrate activity in this area during the winter (M. Thompson, Montana

FWP, pers. com., 29 March 2002). Consequently there would be minor to no effects of the proposed thinning treatments on winter habitat conditions.

Implementation of the Action Alternative would result in the construction of approximately 0.5 miles of permanent road, the reconstruction of approximately 0.12 miles of road, and the construction of approximately 0.2 miles of temporary road. This would result in short and long term increases in road density, which can increase big game vulnerability to hunter harvest. However, the presence of occupied private residences near the main access points greatly reduces the potential affects of these roads on big game vulnerability by creating secure closures to public access.

Treatments as proposed under the Action Alternative would result in reductions in tree competition within stands in the Project Area, which would likely reduce the potential for stand replacing fire events in the future. Therefore, there would be some minor potential beneficial effects as a result of treatment of these stands in the maintenance of winter cover.

From a cumulative effects standpoint, winter cover and elk security within the Analysis Area is limited due to intensive harvesting on private commercial forestlands surrounding the Project Area. Implementation of the Action Alternative would reduce cover and increase road densities, thereby having some minor adverse cumulative effects. However, these effects are very minor due to the low value of this area for wintering big game and the high level of security from hunter harvest as a result of effective access control.

Cumulative Effects Associated with Other DNRC Projects Several other DNRC projects are either ongoing or have undergone scoping in the general area around the Turah Creek Project Area. The following Table displays the name of the proposed activity, the year when activity is planned, and the type of activity proposed. Of the projects listed, all except Donovan are outside of any Analysis Area used in this assessment and would have no measurable cumulative effects on wildlife considered in this assessment. Donovan is a proposed shelterwood harvest located approximately 3 miles to the southeast of the Turah Creek Project Area. It is unlikely that activities associated with Donovan would affect this assessment due to the spatial separation of these projects, the type of harvest proposed in the Donovan project, and the minor incremental effect further treatment would have on wide ranging species in this area. The Ryan Gulch fire, was discussed above relative to effects on black-backed woodpecker habitat. Although some fire salvage has occurred in the fire area, the fire event likely positively affected black-backed woodpecker populations in this area. However, as stated in the black-backed woodpecker section, it is unlikely that this affected the Turah Creek area since no insect infestations or burned habitat occurs in the Project or Analysis Areas which would attract concentrations of black-backed woodpeckers.

Project Name	Air miles from Turah Creek	Year of Proposed Activity	Description of proposed Activity
Deadman Gulch	14	2003	Thinning
Ryan Gulch	10-12	2002	Fire salvage
Cramer	15	2002	Shelterwood
Roman/Six Mile	10	2003	Thinning and PCT
Tyler Creek	22	2004	Shelterwood
Davis Point	11	2005	Overstory removal
Donavan	3-5	2004	Shelterwood
Land of Lodgepole	15	2002	Thinning

ECONOMICS

Alternative A- No Action: Under the No Action Alternative no harvesting would take place and no revenue would be generated.

Alternative B- Action: The Action Alternative would have the following economic effects.
Estimated total harvest volume is 17,000 Tons
Estimated stumpage value is $30/Ton
Estimated return to the trust is $510,000

The costs related to the administration of the timber sale program are only tracked at the Land Office and Statewide level. DNRC does not track project level costs for individual timber sales. An annual cash flow analysis is conducted on the DNRC forest product sales program. Revenue and costs are calculated by Land Office and Statewide. These revenue-to-cost ratios are a measure of economic efficiency.

Revenue cost ratios:

	FY97	FY98	FY99	FY00	FY01
SWLO	2.08	1.8	1.44	2.36	2.69
State	1.89	1.7	1.36	2.78	1.62

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